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APPLIED MATERIALS, INC.  
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EXAMINER

PADGETT, MARIANNE L

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Paper No. 31

Application Number: 09/187,551  
Filing Date: November 05, 1998  
Appellant(s): MUSAKA ET AL.

Chun-Pok Leung  
For Appellant

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**EXAMINER'S ANSWER**

This is in response to the brief on appeal filed 12/14/01 and amended 05/10/02.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences, which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

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**(3) Status of Claims**

The statement of the claims contained in the brief is partially correct.

A complete and concise summary is as follows:

This appeal involves claims 1-10, 27-29 and 31-34.

Claims 11-26 and 30 have been canceled.

**(4) Status of Amendments After Final**

There were no amendments after the final rejection. However, a terminal disclaimer was filed after final with the 11/20/01 request for reconsideration, found proper and entered in the file.

**(5) Summary of Invention**

The summary of invention contained in the brief is deficient because appellant does not cite the support for their summary in the specification, with the exception of discussing Fig. 13 in isolation from the rest of the specification. For the plasma processes, gases used therein and plasma parameters, see the summary on page 5 (or col. 3 of PN. 5,571,571); page 7, line 13 – page 8, lines 4 and 17-26 (col. 4, line 54- col. 5, lines 17 and 49-64); page 9, line 20-28 (col. 6, lines 15-25); page 12, lines 26-30 (col. 8, lines 12-18); and page 13, lines 22- page 14, line 14 (col. 8, line 45- col. 9, line 11).

Concerning appellant's discussion of compressive and tensile stress, it is consistent with what appellant's have claimed in this reissue, but support therefore is not found in the body of the specification as written, and appellants appear to be relying on the declaration of Dr. Musaka, which has discussion which appears to be inconsistent with the specification.

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The background (page 5, lines 4-10 or col. 3, lines 33-40) states "addition of  $\text{NF}_3$  to silicon oxide film reduces intensive stress in the film... leads to films having low compressive stress ..." (emphasis added). Fig. 4, particularly E and F (page 9, line 20- page 10, line 11 or col. 6, line 15-45) discuss disposition of single silicon oxide layers on different substrates with varied Al strip spacing, using  $\text{C}_2\text{F}_6$  at 400 sccm with dual frequencies 13.56 MHz and 400 KHz, and stating "The compressive stress of the above film was found to be  $1 \times 10^9$  dynes/cm<sup>2</sup>" (emphasis added, and note the value is positive). Fig. 7 (A-F) is also single layer deposits using the same gas flows as in Fig. 4, but the single frequency of 13.56 MHz, and teaches "The compressive stress of this film was  $2 \times 10^8$  dynes/cm<sup>2</sup>" (emphasis added, note positive value and discussion on page 12, line 16- page 13, line 6 or col. 7, line 66- col. 8, line 25). Appellant's specification further states "low frequency powers... improves compressive stress... high frequency power... does not affect the compressive stress" (page 14, lines 5-10 or col. 8, line 66- col. 9, line 6). In discussing Fig. 13 (page 7, lines 8-9 and page 14, lines 28-30; or col. 4, line 46-49 and col. 9, line 28-30) the term "stress" is used generically, and is stated that the graph shows "reduced stress with higher  $\text{C}_2\text{F}_6$  flow rates and higher fluorine concentration in the films", appearing to mean that the higher y-axis values in Fig. 13, mean that there is less stress in the film deposited. No discussion of tensile stress was found anywhere in the specification. No depositions on substrates as claimed were taught to produce any stress values other than "compressive stress" when halogen was employed and all those values were positive. No discussion of forming tensile stress when using halogen sources instead of compressive stress when no halogens are employed is found in the original specification or patent 5,571,571. Appellant appears to rely on Dr. Masaka's explanation of Fig. 13 in paragraph 6 of his

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Declaration for all tensile stress limitations. The declaration by itself may explain the negative value in the graph, which are not discussed in the specification, but that same explanation of the declaration appears to contradict the other teachings of the specification, as delineated above, so it does not appear that it is possible for appellant's to give page and line support for their tensile stress related limitations.

**(6) Issues**

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows: Appellant's submitted a Supplemental Declaration under 37 CFR 1.175 on 05/28/02, thus removing the rejection based on a defective declaration under 35 USC 251.

**(7) Grouping of Claims**

Appellant's brief includes a statement that claims (1, 6 & 7), 2, (3-5), (8-10), (27-28), 29, 31, 32, 33 & 34 of groups 1-10, respectively do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

**(8) Claims Appealed**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) Prior Art of Record**

5,288,518	HOMMA	2-1994
0 517 548 A2	HOMMA (EPO)	12-1992
5,429,995	NISHIYAMA et al	7-1995
WO 92/20833	WEISE et al (PCT)	11-1992

**(10) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 27-29 and 31-33 are rejected under 35 U.S.C. 251 as being an improper recapture of broadened claimed subject matter surrendered in the application for the patent upon which the present reissue is based. See *Hester Industries, Inc. v. Stein, Inc.*, 142 F.3d 1472, 46 USPQ2d 1641 (Fed. Cir. 1998); *In re Clement*, 131 F.3d 1464, 45 USPQ2d 1161 (Fed. Cir. 1997); *Ball Corp. v. United States*, 729 F.2d 1429, 1436, 221 USPQ 289, 295 (Fed. Cir. 1984). A broadening aspect is present in the reissue which was not present in the application for patent. The record of the application for the patent shows that the broadening aspect (in the reissue) relates to subject matter that applicant previously surrendered during the prosecution of the application. Accordingly, the narrow scope of the claims in the patent was not an error within the meaning of 35 U.S.C. 251, and the broader scope surrendered in the application for the patent cannot be recaptured by the filing of the present reissue application.

In order to make the claims allowable over the prior art in parent application 08/259,584, the specific halogen F, as well as the specific type of fluorine source,  $CX_4$  or  $CX_3-(CX_2)_n-CX_3$  were added to the claims as well as the minimum concentration of F in the deposited silicon oxide. The new claims introduced in the reissue broaden the scope of the claims to include all types of halogens from any source and do not require a minimum [F], thus broadening the scope of the process claims to include reagents and proportions thereof, excluded in the 08/259,584 prosecution. Furthermore, while the new claims, as exemplified by claims 27, relate the deposition of a layer deposited from gases comprising Si, O and halogen to “a desired stress” or “a tensile stress”, this stress and the concentration of fluorine are inherently related, as can be seen in appellant’s graphs (Figs. 9-13) or in Homma (EPO 517,548 or USPN 5,288,578) in col. 4

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of the EPO reference, hence removing the concentration and source limitations is recapture.

These claims are stating an effect caused by the [F] previously claimed, are essentially paraphrasing in order to broaden the claims, i.e., recapture of previously excluded or surrendered limitations or conditions. There are no actual differences that are not broadening the scope to the steps of the process for making the silicon oxide layer, just in which characteristic are chosen to measure or how one chooses to describe the deposit after making it.

To restate the issue, controlling the stress is intimately or inherently related to controlling the F concentration, hence to claim stress with no clearly defined metes and bounds, in essence recaptures [F] that were excluded by limitations in the patented claims as may be suggested by comparing values in Figures 10 and 13, however since no information is given on plasma conditions, except flow and gas type, one cannot be sure the same deposition processes are being compared in Figures 10-13. For example, Fig. 10 has no data point above 400 sccm C<sub>2</sub>F<sub>6</sub>, so the specification provides no factual information on [F] in the deposits that Mr. Musaka's Declaration says represent tensile stress. As the specification identifies all deposits in the process as having compressive stress, when the type of stress is named, the contradictions between the specification and Declaration are a problem that cannot be corrected by unsupported allegations by appellant's representatives. Claim 34 dependent on claim 33 includes the limits of the PN. 5,571,57's claims, but the broader process conditions, recapture plasma silicon oxide deposition process conditions previous excluded.

Mr. Musaka's Declaration deals only with Fig. 13, and does not tie the information into the rest of the specification, which exclusively discusses (positive) compressive stress for all deposits exemplified for the appellant's invention, hence there are no teachings of desired

deposits characterized by tensile stress. Appellant's allegations on page 11 of the brief, that the compressive stress in the specification are only magnitudes and no negative sign is necessary, remain unsupported, so the evidence in the specification, which is sworn to, must be given greater weight.

Claims 27-29 and 31-34 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 27-29 and 31-34 are rejected under 35 U.S.C. 251 as being based upon new matter added to the patent for which reissue is sought. The added material which is not supported by the prior patent is as follows:

The claims added in this reissue still contain new matter and lack support as written, although Mr. Musaka's declaration almost provides some support to correct this problem, but is inconsistent with teachings of the specification, as noted above in the citations of all support for discussed of stress in the specification. The Declaration should be a supplement to the specification, not a replacement thereof. All the depositions in the Details of the Invention are said to have compressive stress, except the three lines describing Fig. 13, which generically use "stress" and are not explained or discussed with respect to any previous examples, nor said to be more desirable. Particularly, there is no teaching that tensile stress (as derived from paragraph 6 of Mr. Musaka's Declaration and Fig. 13) is more desirable than compressive stress as produced by all examples, nor does the specification compare layers deposited with or without halogens, as



necessarily having tensile stress verses compressive stress. Appellants cite Fig. 13 (and Mr. Musaka's Declaration) as support (page 12-13 brief) saying they do not need written description, but neither, alone or in combination, is sufficient to provide support for claims as written.

Specifically in claim 27, the claim of generic Si oxide layer deposition process (i.e. not limited to plasma processes) and "a tensile stress instead of a compressive stress" are not supported by the original specification language, particularly for comparison of deposition with halogen verses those without. Note all deposits in examples have both halogen (F) and compressive stress. For example, see col. 6, lines 40-45 discussing  $1 \times 10^9$  dynes/cm<sup>2</sup> as compressive stress, seemingly contradicting appellant's comments on tensile stress values on page 5 of the response of 12/22/99 plus the declaration of Mr. Musaka. On page 11 of the Brief appellant's alleged that these are magnitudes that are really negative, but continue to provide no support for their contradiction of the specification. When discussing the inventive process in the specification, all terms involving stress either have no modifier (Fig. 13; col. 4, lines 46-49, and col. 9, lines 28-30) or are "compressive" (col. 6, lines 43-45; col. 8, lines 23-25 and 66; col. 9, line 6), which would imply that all are compressive if any particular kind of stress must be named. For these reasons, the claims contain New Matter. Appellant's response of 12/22/99 and page 12-13 of the Brief cite Fig. 13 for showing their comparison of stresses, and discuss which values are which, however the specification does NOT support their allegations as written, since it shows desire to deposit Si oxide with low compressive stress, not with tensile stress. Further discussion of stresses in the 6/16/00 response, also consisted of unsubstantiated allegations with unclear (if any) relationships to the original specification. Note that claim 31 requires tensile stress less than  $0.4 \times 10^9$  dynes/cm<sup>2</sup>, where no teaching in the specification give

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this range as desirable, but all values on Fig. 13, whether called tensile, compressive, or just stress, are below this value, so all known deposits as provided by the data have stress values below this value. Note, while appellant's page 5 response of 12/22/99 states that at a 600 sccm  $C_2F_6$  flow, the stress becomes tensile stress at about this same value. Mr. Musaka's declaration provides 450 sccm as the transition point, while the compressive stress identified on col. 6, 8 and 9 of the patent disagree with the declaration's apparent definition of the term compressive stress. These various and seemingly contradictory statements on the record, need to be reconciled in a supported manner to clarify this issue as well as be consistent with the specification.

To sum up the New Matter issue, no teaching with or without Mr. Musaka's explanation of Fig. 13, can be found in the specification that a characteristic that is not discussed (tensile stress) is desired in silicon oxide deposits made with halogens in the claimed situation, nor that this deposit is made instead of a non-halogen using deposit with a different characteristic (compressive stress). Further note that Fig. 13 only concerns  $C_2F_6$ , thus provides no evidence of tensile stress for any other the compounds as claimed.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

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The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27-28 and 31 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) or (e) as obvious over Homma (EPO 517,548, A2 or USPN 5,288,518).

Homma teaches the formation of fluorine-containing silicon oxide films where the internal stress is  $2 \times 10^8$  dynes/cm<sup>2</sup> (which is less than  $4 \times 10^8$ ) and the dielectric constant is about 3.7. Several methods of deposition are taught including plasma CVD via a parallel plate reactor and using reaction gases of O<sub>2</sub>, TEOS and FSi(OCH<sub>3</sub>)<sub>3</sub>, called fluorotriethyloxysilane, but could also be called triethylfluorosilicate, so abbreviation could be FTEOS, FTES or TEFS. Homma uses flow controllers, bubblers and nitrogen gas to introduce the reactant gases into the reaction chamber, hence the flow rates are selected and controlled, so for the conditions used, it is seen that the film properties produced are known, i.e., predetermined. As noted by an appellant (page 7 Brief), in the background Homma discuss prior art having "a strong internal tensile stress of

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about  $1 \times 10^9$  dyn/cm<sup>2</sup>" (emphasis added). Note that this strengthens the 102 rejections, as it implies that the internal stress produced by Homma's examples ( $2 \times 10^8$  or  $0.2 \times 10^9$  dynes/cm<sup>2</sup>) is tensile stress as claimed. Since deposits using F are being made, they are necessarily "instead" of those without halogens, whether or not a mental comparison is made. See Fig. 3; col. 1, lines 35-40; and col. 4 lines 8-57 in the EPO reference which is a statutory bar. In the U.S. Patent, see the same teachings, but it is the (e) reference (col. 1, lines 35-40; col. 3, line 40- col. 4, line 18). Note the uncertainty over what appellants mean by their stress is the only reason for the 103 aspect of the rejection, and different measurement for different stresses would have been expected to show correspondence in values due to otherwise equivalent deposition processes.

While appellants have disputed this rejection and discussed Homma (page 5, page 7-8, page 16, 17) they have not explained or argued concerning how the  $2 \times 10^8$  dynes/cm<sup>2</sup> (i.e.  $0.2 \times 10^9$  dynes/cm<sup>2</sup>) internal stress (probably internal tensile stress) differs from there claimed tensile stress, or how a value that is less than their maximum claimed value, is not less.

Claims 1-10, 27-29 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al.

Nishiyama et al also teach deposition of silicon oxide containing F, where plasma CVD, including dual frequency or high density plasma, are used (summary, esp. col. 2, lines 30-60 and col. 3, lines 31-56 and 66-col. 4, line 6). Explicit teachings that [F] in the SiO<sub>2</sub> film "can be easily controlled by controlling the flow rate of the source gas" is found on col. 3, lines 53-56, with example 1 (col. 5-7) teaching reactant gases of TEOS + O<sub>2</sub>+NF<sub>3</sub> where NF<sub>3</sub> flow rates of 50 sccm, 100 sccm, 150 sccm and 200 sccm produced atomic % of about 2, 3, 4 and 5, respectively

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(col. 6, lines 36-50). Col. 7 provided alternate F-source teachings of  $\text{CF}_4$ ,  $\text{ClF}_3$ ,  $\text{SiF}_4$  and  $\text{FSi}(\text{OC}_2\text{H}_5)_3$ , for this example, and discussion of other reactant combinations also showing flow rate dependence for  $[\text{F}]$  deposited. As dopant concentration of fluorine in the silicon oxide deposit of Nishiyama et al would have been expected to inherently effect the stress level as is well known in the art (discussed above) as well as the dielectric constant which Nishiyama explicitly discusses, it would have been obvious to one of ordinary skill in the art that as flow rate of the F-source has been shown by Nishiyama et al to be related to the amount of fluorine deposited, then controlling and adjusting flow rate in order to maintain or produce desired film properties dependent on the  $[\text{F}]$ , such as the dielectric constant or the stress, would have been expected to be an effective and efficient way to produce consistent and desired results.

While Nishiyama et al does not include  $\text{CF}_3\text{H}$  or other fluorocarbon containing hydrogen in the non-exclusive list of other possible fluorine sources, these compounds are analogous or homologous to the  $\text{CF}_4$  explicitly taught, hence would have been obvious to one of ordinary skill in the art as useful alternatives, because they would have been expected to produce the same general trend for  $[\text{F}]$  or dielectric constants or stress effects, using routine experimentation to determine their desirable flow parameters, etc. No advantages were found in appellant's specification for using partially hydrogenated fluorocarbons and excluding perfluorinated ones where the F-sources uses only 1 carbon. Note, all presented measurements used  $\text{C}_2\text{F}_6$  in specification, and the halocarbon formula for 2 to 7 C still includes perfluorinated compounds. Contrary to appellants' (pages 9-10 Brief) statement that Nishiyama does not suggest the use of  $\text{C}_2\text{F}_6$ , col. 2, lines 51-54 suggests its alternate use as a F-source along with  $\text{CF}_4$  or  $\text{NF}_3$ .

It was noted in the parent case's reasons for allowance that Nishiyama et al was differentiated over by the allowed claims in P.N. 5,571,571, because of the use of different precursor materials, however a closer reading of Example 1 (discussed above) showed that the  $\text{TEOS} + \text{O}_2 + \text{NF}_3$  reactant gases were explicitly taught to have effective alternatives for the taught and claimed deposition, with  $\text{CF}_4$ , a previously claimed fluorocarbon being specifically suggested as an alternative for  $\text{NF}_3$  in this deposition, and various atomic % ranging from 2-5% suggested to be deposited dependent on flow rate. The more general teaching on col. 2, lines 53-54, also suggests  $\text{NF}_3$ ,  $\text{CF}_4$  and  $\text{C}_2\text{F}_6$  alternately as other F-sources, thus totally overlapping with appellants halocarbon formulas. Hence, it would have been abundantly obvious to one of ordinary skill in the art to substitute the claimed fluorocarbon compounds, such as  $\text{C}_2\text{F}_6$ , for  $\text{NF}_3$  in the Nishiyama teaching to produce films by processes as claimed with expectation of analogous results. Also note in col. 6, lines 12-25 of example 1, Al wiring, i.e. spaced conductive lines, were formed on the substrate prior to the claimed and taught deposition. Any useful line width would have been expected to be used.

Nishiyama et al's example 6 teaches dual frequency plasma deposition with frequencies as claimed, but a different set of reactant gases ( $\text{FSi}(\text{OC}_2\text{H}_5)_3 + \text{O}_2$ ), however in example 1 on col. 7, lines 22-34, these gases were explicitly taught as possible alternatives to the  $\text{TEOS} + \text{NF}_3$  combination, hence are of ordinary skill in the art would have expected the alternative dual frequency plasma apparatus to be effective with any of the taught gas combinations, hence obvious to use therewith due to the analogous chemistry. Also note that col. 3, line 6 of the summary generally teaches use of plural frequencies differing from each other and increasing [F].

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Note example 1, gives TEOS flow rates as 50 sccm and  $\text{NF}_3$  as 0-500 sccm, depending on layer and trial. As  $\text{NF}_3$  has three F, 50 sccm to 0-500 sccm gives  $1:(0-30) = 14:14(0-30)$  ratio of Si:F which is inclusive of about 14:1, although from Nishiyama et al's teaching one would expect greater amounts of F to produce larger atom% F in the deposit, while appellant's Fig. 9 appears to be saying just the opposite, i.e., that as the ratio of Si to F increases (i.e., F present in reactants with respect to Si) that atomic % F actually goes in the opposite direction (increases), but it is questionable whether this was actually what was meant, since decreasing the fluorine source does not usually increase the amount of it deposited unless some other parameters is significantly changed.

Claims 27-29 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the PCT reference WO 92/20833 to Weise.

Weise teaches the use of halogen etchants, such as  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$ ,  $\text{C}_2\text{Cl}_3\text{F}_3$ ,  $\text{SiF}_4$ , etc., (page 9 and 15) to reduce the defects and amount of hydrogen present as hydroxyl in silicon oxide films deposited by methods inclusive of PECVD (pages 10, 11, 12), using organosilicons, such as TEOS (pages 9 and 13), where the intrinsic stress of the deposit is thereby reduced from what it otherwise would have been. Values are discussed below 200 MPa or more preferably below 100 MPa, i.e., below  $10^9$  dynes/cm<sup>2</sup>. This process is controlled by adjusting the ratios of the gases introduced (pages 10 and 15). As the etchant (halogen gas) is taught to directly affect the intrinsic stress, choice of reactant ratio as taught, is equivalent to predetermining the stress level due to the taught inter-relationship. While Weise does not discuss selecting the rate at which the etchant halogen source is introduced, the parameters of flow rate and reactant ratio are inherently

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related, such that it would have been obvious to one of ordinary skill in the art, that in order to control the ratio of reactants, one must select, i.e., control their flows. Appellant does not discuss why this is not obvious. Neither are H-containing fluorocarbons taught, but the obviousness of that difference discussed above applies equally here, and  $C_2F_6$  is explicitly taught (contrary to appellant's implications) which reads on  $n=2$  with all  $X=F$  in the claimed chemical formula.

Appellant's do not discuss how Weise's intrinsic stress is related to their "tensile stress", but since halogen in the plasma reduces it as it does for the claimed stress, they would appear to be equivalent, hence appellants page 16 (Brief) statement that "there is nothing in the references that suggests those recited features" appears to be inaccurate.

**(11) Response to Argument**

Appellants accuse the examiner of disregarding Mr. Musaka's Declaration, which only deals with Fig. 13. This is not so, but when the specification and the Declaration are in apparent conflict, only limited effect can be provided by the Declaration. Appellants' apparently find it unreasonable that the examiner does not disregard the entirety of the application's written description in favor of the declaration concerning only one figure (Fig. 13 & the 3 lines describing it), and appellant's representative's unsupported allegations to explain the deficiencies in the declaration with respect to the written disclosure. Appellants have been apparently unwilling to supply either prior art support or a more complete declaration to correct these issues in a supported manner.

With respect to recapture, the patented claims do not discuss stress, of any type, but they will inherently have a stress value, and it will be limited by the F concentrations produced in the films (above 2.5 at %) and the source gases. Appellants' new claims 27-29 and 31-33 broaden



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the scope of deposits claimed, as well as materials used, both of which were narrowed and surrendered in the preceding prosecution. This is recapture. It is not dependent on Fig. 13, with or without Mr. Musaka's Declaration, especially as Fig. 13 is insufficient for determining what will produce tensile stress or positive stress values, especially for halogens other than F, as only  $C_2F_6$  gas was employed, and one has no information on what type of plasma parameters that were used, so what other condition might produce the "tensile" stress of Fig. 13/Musakas Declaration, since no teachings of the written description concern tensile stress. Appellant's arguments appear to allege that the introduction of stress makes for a totally different process, but stress was always inherently present, and in the parent case appellants specifically amended the process of depositing silicon oxides on substrates with conductive lines to require that both the gas contain F and the Si oxide deposit contain F, stating that this differentiated from art applied (amendment A of 07/11/95, page 2-4) and in Amendment B of 02/12/96, the requirement for halocarbon sources (formula) and a 2.5 at.% F in the deposits was added to distinguish over the art. Broadening the scope of the process too include sources and products without F, let alone the specific percentage recaptures limitations previously given up.

Appellant's argument with respect to Homma, appear to be that since the examiner maintains that there is a problem in reconciling the Declaration of Dr. Musaka with the written description, then none of the references recite the claimed feature of claims 27-28, Homma included. It would not be logical for appellants to argue that not discussing tensile stress means that there is no tensile stress in the taught deposits, after all PN 5,571,571 does not even discuss tensile stress, but they haven't given any reason why like F-containing Si oxide deposits do not have claimed "tensile" stress. However, Homma as acknowledged by applicants discuss

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"internal tensile stress" in their background, and appellant's have failed to discuss or explain why they can consider the taught  $2 \times 10^8$  dynes/cm<sup>2</sup> internal stress not to read on their tensile stress, especially when claimed conditions were used for its deposits.

With respect to appellants' comments on motivation to develop a fluorocarbon formula, the formulas in the specification (col. 8, lines 45-57) are for all saturated linear halocarbons of from C = 1 to 7. The additions too exclude some species have been added to exclude explicit prior art disclosure after filing, and hardly constitute formula development *per se*. CF<sub>4</sub> of Nishiyama et al's example 1 is in appellant disclosed, i.e., developed, formula set, so Nishiyama et al may be said to have motivated appellants to modify their formula as now claimed.

However, the alternate halocarbon or fluorocarbon homologous of the formula would still have been expected to have analogous chemistry, especially considering that on col. 2, lines 51-54 Nishiyama et al also teach NF<sub>3</sub>, CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub> as alternative F-sources, and appellants have not refuted this teaching. Using a common way of writing a generic class of species does not produce patentable significance.

On page 9 of the Brief, appellants appear to be questioning what is meant by analogous chemistry for homologous compounds. The examiner is not sure what they are unclear about, however anyone of ordinary skill in the art would recognize that C-F bonds on homologous gaseous halocarbon and fluorocarbon compounds would have been expected to react or decompose in the same way, by the same mechanisms in a plasma, etc. These are basic chemistry considerations.

Other than ignoring the C<sub>2</sub>F<sub>2</sub> teachings in Nishiyama et al, appellants provide no reasons why the dependent claims individually or as grouped are separately patentable, except to say

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essentially that since Nishiyama et al does not provide an example that uses every claimed feature exactly (i.e. is a 102), that the claim 5 are allowable, and does not discuss any problems with the examiners reasons for obviousness.

Appellant's discussion of claims 27<sup>+</sup> with respect to Nishiyama et al appear to suggest that since tensile stress is not explicitly discussed, it is not produced, however as previously pointed out all deposits will inherently have some stress level determined by their deposition process. The process of Nishiyama et al corresponds to that claimed, hence stress levels would have been expected to be analogous, as there are no critical differences in the deposition to produce any significant differences in stress. Granted appellant's specification considered with Mr. Musaka's Declaration has very little evidence of what condition might produce "tensile stress", i.e., a flow rates (600 and 809 sccm) of  $C_2F_6$  in an unspecified plasma, but Homma who has analogous depositions (  $FSi(OC_2H_5)_3$  is also an alternative F-source for Nishiyama et al as an alternative  $NF_3$ ,  $CF_4$ , etc.), appears to deposit  $2 \times 10^8$  dynes/cm<sup>2</sup> tensile stress deposit with dielectric consistent of 3.7. Therefore, the Fig. 5 in Nishiyama et al which indicates 4 and 5 at.% F and also has such dielectric constants, would have been expected to have about the same stress, given other deposition similarities. While appellants' arguments essentially ignore the rejections' discussion that the process' production of F dopant concentration would have been expected to produce like stress values, the prior art provides evidence of such expectations, whether or not one calls it tensile or internal stress.

Appellant's discussion of Weise ignores that it teaches reducing stress, as if failure to use the word "tensile" means it cannot be the same stress. Considering that appellant own specification fails to discuss tensile stress, this is not a convincing argument.

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For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

M.L. Padgett/dh  
September 26, 2002  
October 3, 2002  
October 4, 2002  
October 24, 2002



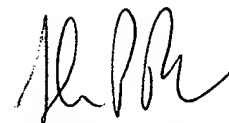
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